

## **REMARKS**

### **I. Status of the Claims**

Upon entry of this amendment, claims 1-6 are pending. The listing of claims is provided as a courtesy to the Examiner. No claims are amended herein.

### **II. Rejection under 35 U.S.C. § 112**

Claims 1-6 have been rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement and failure to comply with the written description requirement. The Examiner asserts that the specification does not disclose how Na<sub>2</sub>O is placed on the surface of the particles in the claims and how the metal hydroxide particles with Na<sub>2</sub>O are provided. This rejection is respectfully traversed for reasons provided below.

The Examiner asserts that the specification does not disclose how the Applicant has “**placed**” Na<sub>2</sub>O on the surface of the particles in the claims. (*see* outstanding Office Action on page 3). Applicant is, quite frankly, confused as to why the Examiner is requiring written description and enablement of a limitation that does not exist in the claims.

As a first matter, claim 1 merely recites that w-Na<sub>2</sub>O is **present** on the surface of the metal hydroxide. The claims simply do not recite an active step wherein w-Na<sub>2</sub>O is “**placed**” on the surface of metal hydroxide particles. Therefore, the Applicant is under no burden to describe or enable such a step. Accordingly, for this reason, the Applicant respectfully requests withdrawal of these rejections.

However, w-Na<sub>2</sub>O is indeed “**present**” on the surface of the metal hydroxide particles, but it is not “**placed**” there; rather, it is “**present**” as a by-product that arises during the process of producing the metal hydroxide. For example, w-Na<sub>2</sub>O is present on the surface of aluminum hydroxide produced from bauxite. In this context, the Applicant hereby presents as supporting evidence Exhibits 1 and 2, attached hereto. Exhibit 1 is a copy of a pamphlet relating to

HIGILITE™, a series of aluminum hydroxide products available from SHOWA DENKO K.K. The Applicant acknowledges that this pamphlet is in Japanese and apologizes to the Examiner for this. However, the Applicant has provided translations of pertinent parts of Exhibit 1 (embedded in Exhibit itself). Also, the Applicant has provided a similar Table in Exhibit 2, which is an English language version of relevant parts of a table that appears in the Product Information page for HIGILITE™ (the source for Exhibit 2 is the SHOWA DENKO website at [http://www.products-e.sdk.co.jp/50on\\_e.html](http://www.products-e.sdk.co.jp/50on_e.html)).

The Table provided at p. 4 of Exhibit 1 shows the amount of w-Na<sub>2</sub>O (in % by weight) that is present in **commercially available** HIGILITE™ aluminum hydroxide products (produced from bauxite) (*see* row entitled “w-Na<sub>2</sub>O” of Table on page 4 of Exhibit 1, which row Applicant has marked with an arrow labeled “w-Na<sub>2</sub>O. The same information is shown in the Table in Exhibit 2 (*see* row “w-Na<sub>2</sub>O” of Table in Exhibit 2, which row Applicant has also marked with an arrow labeled “w-Na<sub>2</sub>O”). The information provided in the row labeled “w- Na<sub>2</sub>O” in the Table at p. 4 of Exhibit 1 is identical to that provided in the same row of the Table of Exhibit 2. Thus, as the Examiner can clearly see in both Exhibits, aluminum hydroxide products from SHOWA DENKO K.K. contain w-Na<sub>2</sub>O in amounts ranging from 0.03 to 0.13 (in % by weight).

As clearly stated in the original specification in the paragraph beginning at p. 6, line 21 and ending at p. 7, line 2, aluminum hydroxide with a w-Na<sub>2</sub>O content of 0.1% or less is suitable for use in the claimed invention, while aluminum hydroxide with a w-Na<sub>2</sub>O content of more than 0.1%, as exemplified by H43-S, is not. Applicant submits that the HIGILITE™ example provided in the attached Exhibits is merely one example of commercially available aluminum hydroxide particles having w-Na<sub>2</sub>O present on their surfaces. Other examples of commercially available metal hydroxides having w-Na<sub>2</sub>O of 0.1% or less are provided in the original specification, and include: (i) “Pyrolyzer HG”, for which w-Na<sub>2</sub>O is present in an amount equal to 0.05% by weight (*see* specification as filed at page 30, lines 14-20); (ii) “BW103ST”, for which w-Na<sub>2</sub>O content = 0.05% by weight (*see* specification at page 32, lines 1-6); and (iii)

"Kisuma 5A", for which w-Na<sub>2</sub>O content = 0.001 % by weight (*see* specification at page 33, lines 5-9). The Applicant submits that it is not the intention of the claimed invention to **produce** metal hydroxide particles with a w-Na<sub>2</sub>O surface content of 0.1% or less because they are commercially available as set forth above. Put another way, the Applicant respectfully contends that because metal hydroxides with a w-Na<sub>2</sub>O surface content of 0.1% or less (by weight) as used in the claimed invention are **commercially available**, there is no need to describe or enable how to make metal hydroxide particles with the requisite amounts of surface w-Na<sub>2</sub>O – one of ordinary skill in the art at the time of filing of the instant application, upon reading the description provided in the instant specification, would simply go out and buy one of the aluminum hydroxide products (with the requisite w-Na<sub>2</sub>O content) disclosed in the specification.

Therefore, Applicant submits that the Examiner's rejection under 35 U.S.C. § 112, first paragraph, is moot in light of these arguments.

In view thereof, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-6 under 35 U.S.C. § 112, first paragraph.

### **CONCLUSION**

This application is believed to be in condition for allowance, which is earnestly solicited. If the Examiner believes there are further issues that could be advanced by an interview or entry of an Examiner's Amendment, the Examiner is invited to contact the undersigned attorney.

Dated: August 20, 2009

Respectfully submitted,

By 

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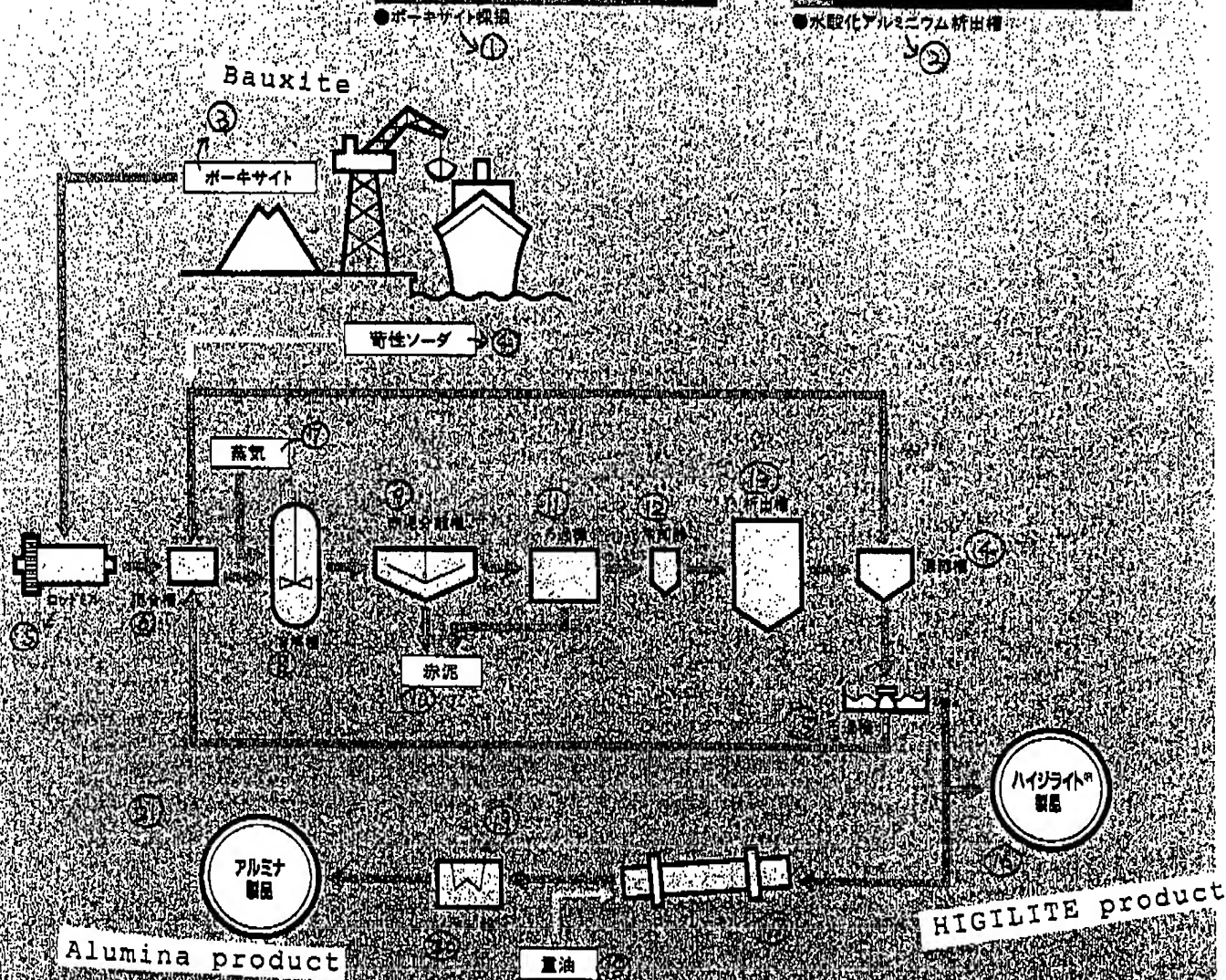
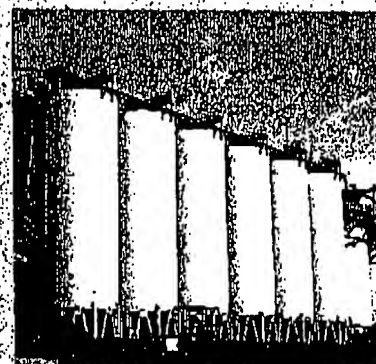
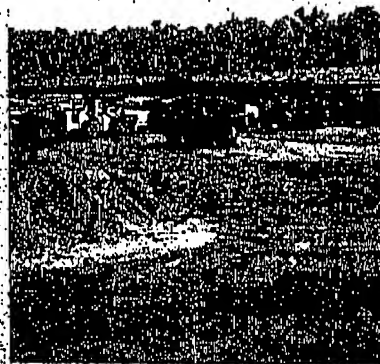
# **EXHIBIT 1**



# アルミナ ハイジライト



PRODUCT GUIDE



# ハイジライト

(水酸化アルミニウム)

HIGILITE<sup>R</sup>

→ (Aluminum hydroxide)

ハイジライトはボーキサイトを原料とし、パイヤー法により製造された水酸化アルミニウムで、化学式 $Al(OH)_3$ または $Al_2O_3 \cdot 3H_2O$ で表わされます。

ハイジライトはGibbsiteまたはHydrargilliteと呼ばれる白色粉末結晶で、約200°Cまで安定ですが、それ以上の温度では結晶水の解離反応が起り、大きな吸熱を示します。また、強酸、強塩基との反応によりアルミニウム塩、アルミン酸塩となります。

別表に示されるように幅広い用途を持ち、その用途に従って、粗粒・標準粒・細粒・微粒のハイジライトを用意しております。

また、当社ではハイジライトの特殊加工品、高白色品を生産し、先端市場のニーズに応えるべく努力しております。

## ■ Characteristics of HIGILITE

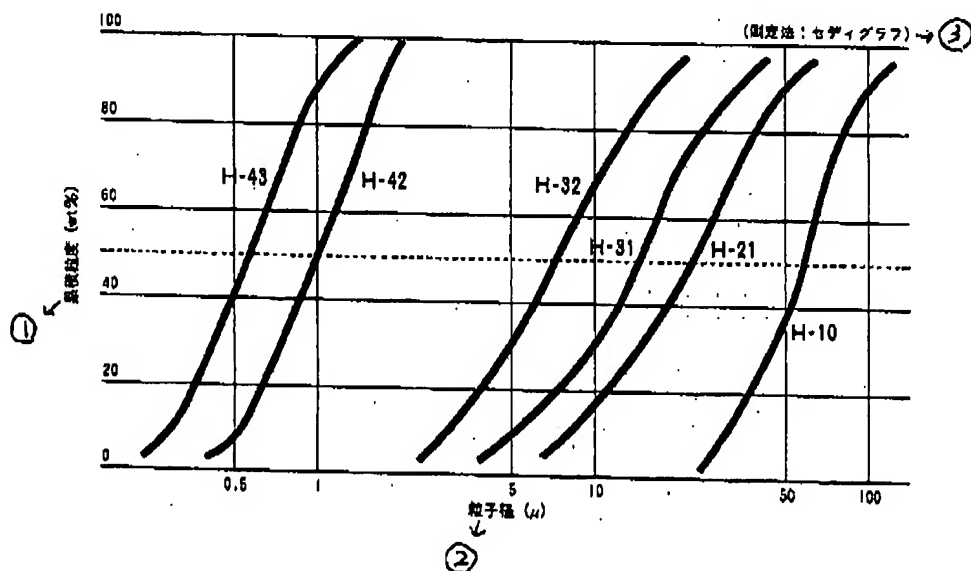
### ■ ハイジライトの特性

①	ギブサイト → ⑦
②	単斜晶系 a: 8.62, b: 5.05, c: 9.70 Å
③	(001) 完全
④	242
⑤	3
⑥	1.57
⑦	0.29 cal/g·°C (25°C)
⑧	(010)10.9, (001)15.4, (100)13.1, (10T)39, (101)-5.6

既存化学物質番号 1-17

## ■ Particle size distribution of HIGILITE

### ■ ハイジライトの粒度分布





# 特殊加工ハイジライト®

→ Specially processed HIGILITE®

ハイジライトの優れた特性である難燃性や低発煙性をより広い用途にご利用いただくため、ゴム・プラスチックとの相容性を向上させた製品など、特殊加工品を各種用意しております。

## 1. カップリング剤処理品

シラン系やチタネート系カップリング剤でコーティング処理したもので、樹脂との相容性を向上させたものです。

## 2. 低粘度品

液状プラスチックに充填する場合の粘度上昇が小さくなるように改良したものです。

## 3. 低導電率品

電気絶縁用途向けに耐湿性や絶縁抵抗を改良したもので、耐熱性を要求される用途にも適します。

## 4. ステアリン酸処理品

ステアリン酸にて表面処理したもので、ゴムやプラスチックへの分散性を改良したものです。

## ■ Applications

### ■ 用途

- (1) カップリング剤処理品：BMC、SMC、人造大理石、エポキシ成形品、ポリオレフィン電線
- (2) 低粘度品：BMC、SMC、スプレーハンドレーアップ成形によるFRP各種製品、建材
- (3) 低導電率品：エポキシ、ポリウレタン樹脂塗布製品、プリント配線基板その他各種電子・電気部品
- (4) ステアリン酸処理品：ゴム、塩化ビニール樹脂、ポリオレフィン各種製品

※表記以外の製品のご用命も受けたまわっております。  
お気軽にご相談下さい。

## ■ Representative characteristic value for quality

### ■ 品質代表特性値

	②	③	④	⑤	⑥
①	0.19	0.23	0.27	0.19	0.13
②	99.6	99.6	99.6	99.6	99.6
③	0.01	0.01	0.01	0.01	0.01
④	0.01	0.01	0.01	0.01	0.01
⑤	0.21	0.32	0.32	0.21	0.21
⑥	0.03	0.06	0.06	0.04	0.04
⑦	3.5	1.0	1.0	3.5	3.5
⑧	—	—	—	—	—
⑨	0.09	0.02	0.01	0.05	0.06
⑩	0.6	0.3	0.4	0.5	0.7
⑪	1.1	0.6	0.7	1.0	1.1
⑫	91	94	94	92	90
⑬	17	38	36	28	16
⑭	17	35	30	20	15
⑮	—	—	—	9.3	—
⑯	3.0	5.0	5.0	3.5	2.6
⑰	0.80	0.30	0.32	0.60	0.25
⑱	150	—	—	150	—
⑲	—	—	—	—	—

\* 相対湿度70%、温度25℃



*translation*

(p3)

- ① Bauxite mining
- ② Aluminum hydroxide precipitation tank
- ③ Bauxite
- ④ Caustic soda
- ⑤ Rod mill
- ⑥ Mixing tank
- ⑦ Steam
- ⑧ Dissolving tank
- ⑨ Red mud separation tank
- ⑩ Red mud
- ⑪ Filter
- ⑫ Cooler
- ⑬ Precipitation tank
- ⑭ Concentration tank
- ⑮ Filter
- ⑯ HIGILITE product
- ⑰ Rotary kiln
- ⑱ Heavy oil
- ⑲ Water
- ⑳ Cooler
- ㉑ Alumina product
- ㉒ Alumina calcinating kiln
- ㉓ Production control room
- ㉔ Product inspection

(p4)

## **HIGILITE<sup>®</sup>**

### **(Aluminum hydroxide)**

HIGILITE is aluminum hydroxide produced from bauxite through the Bayer Process, and the chemical formula is  $\text{Al}(\text{OH})_3$  or  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ .

HIGILITE is a white powder crystal called Gibbsite or Hydrargillite, which is stable up to about 200°C. At 200°C or higher, however, dissociation reactions of the crystallization water begin, which shows a large endotherm. In addition, HIGILITE reacts with strong acid and strong base to yield an aluminum salt or an aluminate.

HIGILITE is used for various purposes, as shown in attached table, and is provided in the form of coarse particles, standard particles, fine particles, and very fine particles, depending on the intended use.

We are making efforts to meet the need of advanced markets by offering specially processed and highly white HIGILITE.

**■ Characteristics of HIGILITE**

- ① Mineral name
- ② Crystal system
- ③ Cleavage property
- ④ Absolute specific gravity
- ⑤ Hardness (Mohs hardness)
- ⑥ Refractive index
- ⑦ Specific heat
- ⑧ Thermal expansion coefficient
- ⑨ Gibbsite
- ⑩ Monoclinic system
- ⑪ Complete
- ⑫ Existing chemicals No.

**■ Particle size distribution of HIGILITE**

- ① Cumulative percentage of particle size
- ② Particle size
- ③ Measurement method: Sedi Graph

(p8)

### **Specially processed HIGILITE<sup>®</sup>**

In order that excellent properties of fire retardancy and low smoke evolution of HIGILITE may be utilized for wide range of application, varieties of specially processed products such as a product with improved compatibility with rubber and plastics are provided.

#### **1. Product treated by coupling agent**

The product is subjected to coating processing by using silane-based or titanate-based coupling agent. The product has improved compatibility with resins.

#### **2. Product of low viscosity**

The product is improved so that the increase in the viscosity when incorporating HIGILITE into liquid plastic becomes smaller.

#### **3. Product of low electrical conductivity**

The product has improved humidity resistance and insulation resistance, for electrical insulation purpose. The product is also suitable for the

application requiring heat resistance.

#### 4. Product treated by stearic acid

The product is treated by stearic acid on the surface. The product has improved dispersibility in rubber and plastics.

### ■ Applications

(1) Product treated by coupling agent: BMC, SMC, artificial marble, epoxy-molded articles, and polyolefin electric cables.

(2) Product of low viscosity: BMC, SMC, various FRP products prepared by spray hand layup forming, and building materials.

(3) Product of low electrical conductivity: epoxy resin or polyurethane resin molded articles, printed circuit boards, and varieties of electronic and electric parts.

(4) Product treated by stearic acid: rubbers, polyvinyl chloride resins, various products of polyolefin resins.

### ■ Representative characteristic value for quality

- ① Quality item
- ② Product name

- ③ Product treated by coupling agent
- ④ Product of low viscosity
- ⑤ Product of low electrical conductivity
- ⑥ Product treated by stearic acid
- ⑦ Chemical composition
- ⑧ Attached water
- ⑨ Average particle diameter
- ⑩ Bulk density
- ⑪ Light pack
- ⑫ Heavy pack
- ⑬ Whiteness
- ⑭ Oil absorption
- ⑮ Linseed oil
- ⑯ Slurry
- ⑰ BET specific surface area
- ⑱ Percentage of equilibrium moisture absorption
- ⑲ Slurry electrical conductivity
- ⑳ Relative humidity 70%, temperature 25°C

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# **EXHIBIT 2**

## ■ Typical properties

Properties		Coupling-agent-treated				Low-viscosity		Low-conductivity		Stearic-acid treated	
		H-32ST	H-42STV	H-42STE	H-42T	H-34	H-34HL	H-32I	H-42I	H-42S	H-43S
Chemical composition	Moisture (%)	0.15	0.14	0.14	0.20	0.20	0.17	0.09	0.15	0.20	0.35
	Al(OH) <sub>3</sub> (%)	99.80	99.60	99.60	99.60	99.80	99.80	99.80	99.70	99.60	99.60
	Fe <sub>2</sub> O <sub>3</sub> (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	SiO <sub>2</sub> (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Na <sub>2</sub> O (%)	0.18	0.35	0.35	0.33	0.22	0.22	0.15	0.29	0.33	0.40
	w-Na <sub>2</sub> O (%)	0.03	0.05	0.05	0.05	0.04	0.03	0.003	0.008	0.05	0.13
+45 μm (%)		0.06	0.02	0.02	0.01	0.06	0.05	0.03	0.01	0.01	0.04
Median particle size (μm)		4.0	1.1	1.1	1.1	4.0	4.0	8.0	1.1	1.1	0.75
Bulk density (g/cm <sup>3</sup> )	Loosed	0.6	0.3	0.3	0.4	0.5	0.7	0.7	0.2	0.4	0.3
	Tapped	1.1	0.6	0.6	0.7	1	1.1	1.1	0.5	0.7	0.6
Whiteness		91	94	94	94	92	90	94	96	98	96
BET specific surface area (m <sup>2</sup> /g)		3.0	5.0	5.0	5.0	3.5	25	2.0	5.4	5.0	7.5

←w-Na<sub>2</sub>O

(References)